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3,354,903

DISC VALVE

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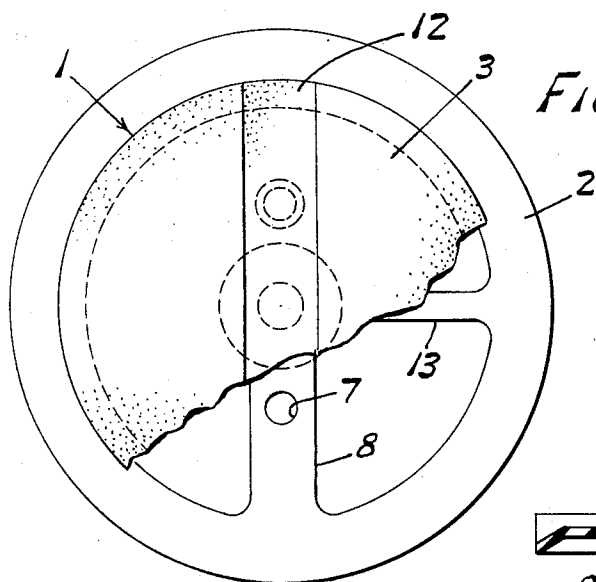


FIG. 1.

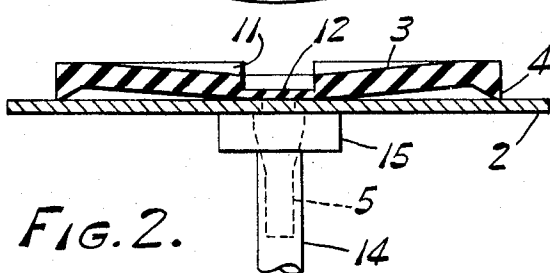


FIG. 2.

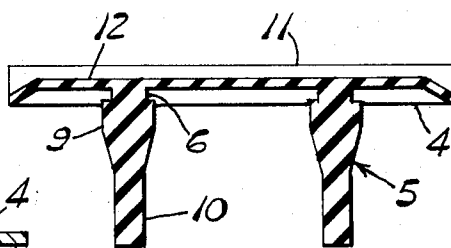


FIG. 3.

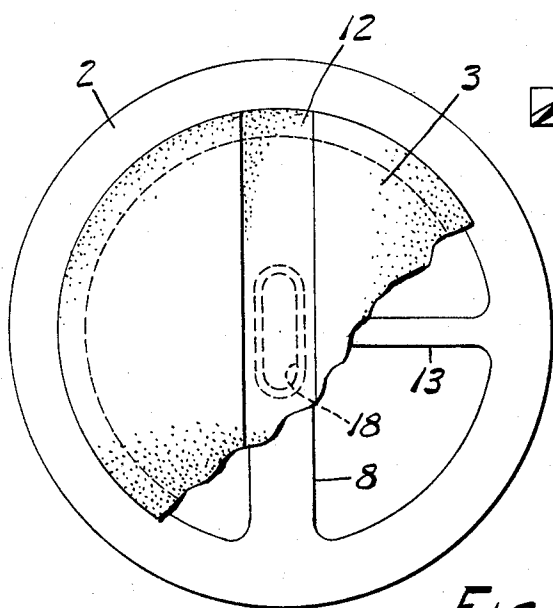


FIG. 4.

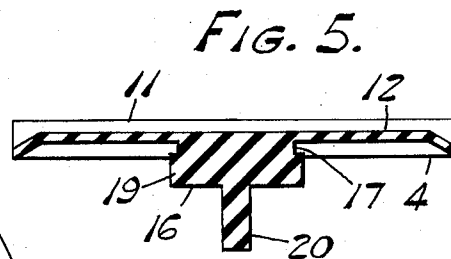


FIG. 5.

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3,354,903 DISC VALVE

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5 Claims. (Cl. 137—512.15)

This invention relates generally to the valve art, and more specifically, to a new and useful flapper valve.

The primary object of my invention is to provide a flapper valve which opens with a minimum of effort, while providing a high degree of resistance to back flow.

Another object of my invention is to provide a flapper valve which opens easily and with little increase in the pressure required to move the valve from partially open to fully open condition.

Still another object of my invention is to provide the foregoing in a valve of simple and inexpensive construction.

In one aspect thereof, a flapper valve constructed in accordance with my invention is characterized by the provision of a valve body, means for mounting the valve body against a seat, a diametral groove across the valve body, the groove defining a hinge axis about which the valve body folds during opening movement, and a seat including a supporting web in backup relation to that portion of the valve body which contains the groove.

The foregoing and other objects, advantages and characterizing features of my invention will become clearly apparent from the ensuing detailed description of certain presently contemplated illustrative embodiments thereof considered in conjunction with the accompanying drawing depicting the same wherein like reference numerals denote like parts throughout and wherein:

FIG. 1 is a top plan view of a flapper valve of my invention in place on a valve seat, the valve being broken away to show details of the seat and backup web;

FIG. 2 is a transverse sectional view thereof, the valve seat centering stem being broken away for convenience in illustration;

FIG. 3 is a transverse sectional view of the valve of FIG. 1, taken at right angles to the view thereof shown in FIG. 2;

FIG. 4 is a view like FIG. 1 but showing a modified construction; and

FIG. 5 is a transverse sectional view like that of FIG. 3 but showing the modification of FIG. 4.

Referring now in detail to the illustrative embodiments depicted in the accompanying drawing, there is shown in FIGS. 1-3, a flapper valve 1 in conjunction with a valve seat 2. Valve 1 comprises an integral construction molded in one piece of a resiliently flexible material, such as silicone rubber. Valve 1 is formed to provide a valve body 3 having a depending peripheral lip 4 normally urged into sealing contact against valve seat 2, as shown in FIG. 2.

The valve body is mounted on the valve seat by a pair of anchor lugs 5, each having a reduced neck portion 6 arranged to fit within an opening 7 in a web 8 across seat 2. Below neck portions 6, each anchor lug is formed to provide an enlarged, shouldered portion 9 which is pulled through the web opening 7 by the lug terminals 10 and which engages behind web 8 to anchor valve body 3 in the position shown in FIG. 2.

To provide for opening of valve 1 with a minimum of opening pressure, I provide a diametral groove 11 in body 3 completely thereacross. Groove 11 thereby provides a body portion 12 of reduced thickness, defining a hinge portion about which the opposite halves of the valve body fold during opening movement. Groove 11 extends com-

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pletely across the valve body, and downwardly through the lip 4, thereby providing the reduced thickness portion 12 completely across the valve body, portion 12 being of uniform thickness throughout for uniform flexing action.

With this construction, the opposite halves of the valve body fold easily about the groove. Once the valve opens, even partially, very little increase in pressure is required to completely open the valve, because of the reduced thickness fold portion 12 provided by the diametral groove 11. Because the valve hinges wide open, it is particularly useful for straight through flow.

It is important that the valve offer resistance against back flow. The reduced thickness portion 12 is much weaker and less self-supporting than the rest of the valve body 3 and therefore is a point of weakness against reverse flow. Accordingly, I provide the supporting web 8 in backup relation to the reduced thickness body portion 12. Web 8 is substantially as wide as groove 11 and co-extensive therewith, thereby reinforcing the relatively weak hinge portion 12 and supporting it against collapse under conditions of reverse flow.

The provision of spaced anchor lugs 5 lengthwise of groove 11 and anchor lug receiving openings 7 spaced apart lengthwise of web 8, orients the valve with respect to its seat to insure that the valve hinge portion 12 is supported by the web 8. In other words, the valve 1 must be oriented to the position shown before the anchor lugs can be engaged with the web 8.

Additional supporting webs 13 can be provided, if desired, and the valve seat 2 has a centering stem 14 extending from a hub 15 for positioning the seat in a receiving body, not shown. The provision of spaced anchor lugs 5 avoids interference with such a centering stem while providing the requisite orientation and anchoring of the valve.

The embodiment of FIGS. 4 and 5 is very similar to that of FIGS. 1-3 except that the valve seat does not have a centering stem and the valve has a single, centrally positioned anchor lug 16. Lug 16 has a neck 17 of flat sided form received in an opening 18 of corresponding outline through supporting web 8. An enlarged shouldered portion 19 is pulled through opening 18 by the terminal extension 20, to engage against the opposite side of web 8 and thereby anchor the valve in place on its seat.

The valve of FIGS. 4 and 5 is diametrically grooved to provide the hinge portion 12 of reduced thickness and it opens and is supported against reverse flow in the same manner as the valve of FIGS. 1-3. The non-circular configuration of anchor lug neck 17 and supporting web opening 18 insure proper orientation of the grooved valve body relative to the supporting web before the valve can be anchored to the seat.

Accordingly, it is seen that my invention fully accomplishes its intended objects. While I have shown and described only two embodiments of my invention, that has been done by way of illustration only, it being intended that the scope of my invention be defined by the appended claims.

Having fully disclosed and completely described my invention and its mode of operation, what I claim as new is:

1. A flapper valve comprising, in combination with an annular valve seat, a circular valve body of resiliently flexible material having a peripheral sealing lip, means mounting said valve body on one side of said seat with said lip urged into sealing engagement with said seat, a diametral groove extending completely across said valve body in the side thereof opposite said seat, said groove providing a body portion of substantially uniform reduced thickness extending completely across said valve body, and a supporting web across said seat in back-up relation to said reduced body portion, said valve body mounting

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means comprising anchor lug means extending from said reduced thickness body portion on the web side thereof, said lug means engaging said web and orienting said body portion with respect thereto, said anchor lug means defining hinge axes in said reduced thickness body portion and coextensive therewith about which the opposite halves of said body fold relatively easily upon opening movement of said valve in response to flow in one direction, and said supporting web being substantially as wide as said groove and substantially coextensive therewith for supporting said reduced thickness body portion against reverse flow.

2. A flapper valve as set forth in claim 1, wherein said anchor lug means comprise a pair of anchor lugs spaced apart along said web.

3. A flapper valve as set forth in claim 1, wherein said anchor lug means comprises an anchor lug extending through said web and having a portion of non-circular outline coacting with said web to orient said valve body.

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4. A flapper valve as set forth in claim 1, said valve body having a normally generally flat outer face, said groove being in said outer face of said valve body.

5 5. A flapper valve according to claim 4, wherein said valve seat is generally flat.

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